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(54) IMPROVEMENTS RELATING TO SOLDERING INSTRUMENTS

(71) We, ADCOLA PRODUCTS LIMITED, a British Company, of Adcola House, Gauden Road, London, SW4 6LN, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to electrically-heated soldering instruments which are thermostatically controlled by means of a thermal sensor which responds to the working temperture of the bit. A thermistor represents an ideal form of temperature sensor in that it is sensitive to relatively small changes of temperature and is small in size. Despite this, difficulties have been encountered in locating a thermistor where it will obtain an accurate response to bit temperature without, at the same time, interfering with the normal operation of the instrument.

In one form of construction the thermistor has been located near the handle of the instrument at an appreciable distance to the rear of the bit. This has resulted in thermal time lag and hence poor temperature control. Another possibility has been to fit the thermistor in a bore in the bit so that it is located immediately behind the working face of the bit. From a theoretical point of view this results in the best control of bit temperature, but this is outweighed by practical disadvantages. Not only does it add appreciably to the expense of each individual bit, but the presence of the bore immediately behind the bit face leads to a marked loss in the ability of the bit to conduct heat forwardly to the bit face. Various other possibilities also exist, but none has proved very satisfactory in practice.

According to the present invention, a temperature sensing thermistor is located externally of the bit, but in close thermal contact with it between its working face and the heating element. In this way, the thermistor is able to respond to the working temperature of the bit almost as accurately as if it were located in a bore immediately behind the working surface, but without the complications of drilling out the bit. It will be understood that the thermistor is located in the thermal path between the heating element and the working face of the bit so that any thermal time lag is reduced to acceptable limits and the temperature control is thereby enhanced.

Generally speaking the heating element is in the form of a coil and needs to be enclosed by a protective tube. This may be closed at its forward end and the thermistor then be located within the tube adjacent its closed end. This facilitates the fitting of the thermistor while ensuring that it is fully protected.

In the majority of constructions of soldering instruments, the bit is fitted into a tubular holder on which the heating coil is wound. The protective tube covering the heating coil then needs to extend forwardly and finally to taper inwardly into contact with the bit holder. This leaves an annular space of generally triangular cross-section into which a heat transfer ring may be fitted, in or on which the thermistor is located. This ensures that the thermistor is in thermal contact with the bit holder which, in its turn, is in thermal contact with the bit. The ring is preferably made of metal, e.g. a good thermal conductor such as aluminium, and the thermistor is then located in a recess adjacent the inner surface of the ring, which can be formed by slitting or drilling of the ring. As an alternative, the heat transfer ring may be formed of a heat conductive paste. With either of these forms of heat transfer arrangement, excellent thermal control can be obtained, for example of the order of + or — 5°C at 360°C.

A construction of soldering instrument in accordance with the invention will now be described in more detail, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a view of a complete instrument partially in section at the forward end, and

Figure 2 is a sectional view of the for-

ward end of the instrument shown to a larger scale.

The majority of the construction of the soldering instrument illustrated is of normal design and comprises a tubular bit holder 6 within which a bit 7 is fitted. A heating coil 10 is wound on the bit holder 6, being covered with a layer of insulation 11 and an outer protective tube 12. As seen in Figure 1, the tube 12 extends as far as the handle 14 of the instrument which is fitted with a normal supply cable 15. The internal electrical connections are not shown, but the cable 15 includes a power supply to the heating coil 10 and also further conductors connected to a thermistor 17 which transmit signals to a thermostatic conrol circuit.

As best seen from Figure 2, the protective tube 12 tapers inwardly at its forward end 13 into engagement with the bit holder 6. This defines an annular space of generally triangular cross-section into which is fitted a heat transfer ring 18 which holds the thermistor 17. The thermistor 17 is located in a recess 19 formed in the end surface of the ring 18 so that the thermistor 17 is in close thermal contact with the bit holder 6 and hence with the bit 7. Consequently, the thermistor is located in the thermal path between the heating coil 10 and the working face of the bit 7 so as to provide an accurate response to temperature changes of the working face of the bit 7.

As illustrated, the bit holder 6 is made from stainless steel which, although desirable for reasons such as mechanical strength and resistance to corrosion, is a poor heat conductor. In order to avoid impeding the flow of heat from the heating coil 10 to the bit 7, the wall thickness of the bit holder must be kept very small and a typical acceptable value of wall thickness is between 0.010 and 0.020 inches. If, as an alternative, the bit holder 6 is made of a good heat conductor such as an aluminium or copper alloy, the wall thickness may be sufficiently large to accommodate the thermistor within the thickness of the wall itself and the construction illustrated may be modified by omission of the heat transfer ring 18.

WHAT WE CLAIM IS:—

1. An electrically-heated soldering instrument having a temperature sensing thermistor for the purpose of thermostatic control of the heating current located externally of the bit, but in close thermal contact with it between its working face and the heating element.

2. An electrically-heated soldering instrument according to claim 1, in which the heating element is in the form of a coil enclosed by a protective tube which is closed at its forward end and the thermistor is located within the tube adjacent its closed end.

3. An electrically-heated soldering instrument according to claim 2, including a tubular holder for the bit, with which the thermistor is in thermal contact.

4. An electrically-heated soldering instrument according to claim 3, in which the protective tube is tapered inwardly into contact with the bit holder at its forward end, the annular space of generally triangular cross-section thus defined including a heat transfer ring, in or on which the thermistor is located.

5. An electrically-heated soldering instrument according to claim 4, in which the heat transfer ring is made of metal and the thermistor is located in a recess adjacent the inner surface of the ring.

6. An electrically-heated soldering instrument having a temperature sensing thermistor for the purpose of thermostatic control of the heating current which is located substantially as described and as illustrated with reference to the accompanying drawings.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

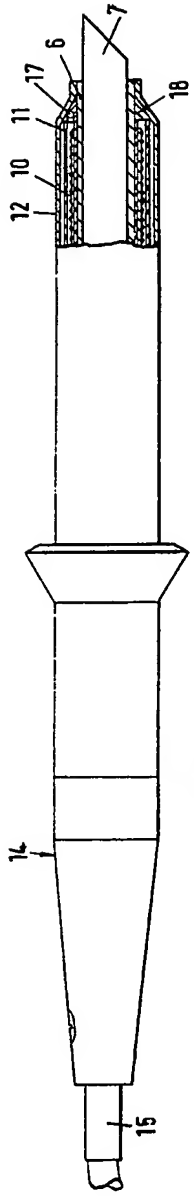

FIG.1.

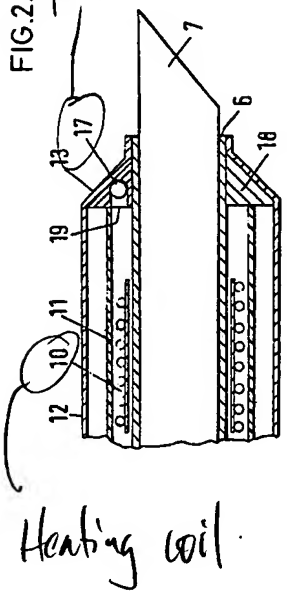

FIG.2.